

**DIPLOMA IN CIVIL ENGINEERING (DCLEVI) /
ADVANCED LEVEL CERTIFICATE IN CIVIL
ENGINEERING (ACCLEVI)**

Term-End Examination

December, 2017

00962

**BICE-024 : SOIL MECHANICS AND FOUNDATION
ENGINEERING**

Time : 2 hours

Maximum Marks : 70

Note : *Attempt any five questions. Question no. 1 is compulsory. All questions carry equal marks. Use of scientific calculator is allowed.*

1. Choose the correct option in the following questions : $7 \times 2 = 14$

(a) Relative density of a compacted dense sand is approximately equal to

- (i) 0.4
- (ii) 0.6
- (iii) 0.95
- (iv) 1.20

(b) Water content of soil can

- (i) never be greater than 100%
- (ii) take values only from 0% to 100%
- (iii) be less than 0%
- (iv) be greater than 100%

- (c) A pycnometer is used to determine
- (i) water content and void ratio
 - (ii) specific gravity and dry density
 - (iii) water content and specific gravity
 - (iv) void ratio and dry density
- (d) Valid range for n , the % void, is
- (i) $n \leq 0$
 - (ii) $n > 0$
 - (iii) $0 \leq n \leq 100$
 - (iv) $0 < n < 100$
- (e) Void ratio of a soil mass can
- (i) never be greater than zero
 - (ii) be zero
 - (iii) take value between 0 to 1 only
 - (iv) take any value greater than zero
- (f) Terzaghi bearing capacity factors N_c , N_q and N_γ are functions of
- (i) angle of internal friction only
 - (ii) cohesion only
 - (iii) both cohesion and angle of internal friction
 - (iv) None of the above
- (g) For a base factor, the depth factor D_f is
- (i) zero
 - (ii) 1
 - (iii) $0 < D_f < 1$
 - (iv) $D_f > 1$

2. (a) Find the relation between e , G , w and S_r for a soil sample, where e = void ratio, G = specific gravity, w = water content, S_r = saturation ratio. 7
- (b) The porosity of a soil sample is 35% and the specific gravity of its particles is 2.7. Calculate its void ratio, dry density and submerged density. 7
3. (a) Explain Darcy's law and briefly describe a method for determination of the coefficient of permeability in a laboratory. 7
- (b) What is effective stress principle ? Explain briefly. 7
4. (a) What is Mohr's strength theory for soils ? Sketch typical strength envelopes for a clean sand. 7
- (b) A consolidated undrained test was conducted on a soil sample with effective pressure, $\sigma_3 = 100 \text{ kN/m}^2$. The deviator stress at failure was found to be 60 kN/m^2 . The soil is known to have effective parameters, $C' = 0$ and $\phi' = 30^\circ$ and total parameters under undrained condition, $C_u = 0$ and $\phi_u = 13.3^\circ$. What is the pore water pressure at failure ? 7

5. (a) What are the factors which affect the compaction density of soil ? Explain briefly. 7
- (b) What is a compaction curve ? Show it with a neat sketch and briefly explain its utility. 7
6. (a) Write the assumptions in Terzaghi's analysis for bearing capacity of soil and discuss the effect of water table on the bearing capacity of soil. 7
- (b) Briefly explain various factors which effect the depth of a shallow foundation. 7
7. Write short notes on any *four* of the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Disturbed and Undisturbed Samples
- (b) Negative Skin Friction
- (c) Safe Bearing Capacity and Allowable Bearing Capacity
- (d) Degree of Saturation
- (e) Index Properties
- (f) Methods of Soil Exploration
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